DOCUMENT RESUME

ED 142 974 CS 003 612

AUTHOR Anderson, Richard C.; Pichert, James W.
TITLE Recall of Previously Unrecallable Information Following a Shift in Perspective. Technical Report No. 41.
INSTITUTION Bolt, Beranek and Newman, Inc., Cambridge, Mass.; Illinois Univ., Urbana. Center for the Study of Reading.
SPONS AGENCY National Inst. of Education (DHEW), Washington, D.C.
PUB DATE Apr 77
CONTRACT 400-76-0116
GRANT NIE-G-74-0007
NOTE 37p.

EDRS PRICE MF-$0.83 HC-$2.06 Plus Postage.
DESCRIPTORS *Cognitive Processes; College Students; Literary Perspective; *Memory; *Reading Research; *Recall (Psychological); Retention; Role Playing; Theories
IDENTIFIERS *Center for the Study of Reading (Illinois); *Schemata

ABSTRACT

College undergraduates read a story about two boys playing hooky from school from the perspective of either a burglar or a person interested in buying a home. After recalling the story once, subjects were directed to shift perspectives and then recall the story again. In two experiments, subjects produced on the second recall significantly more information important to the second perspective that had been unimportant to the first. They also recalled less information unimportant to the second perspective which had been important to the first. These data clearly show the operation of retrieval processes independent from encoding processes. An analysis of interview protocols suggested that the instruction to take a new perspective led subjects to invoke a schema that provided implicit cues for different categories of story information. (Author)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

ED142974

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

CENTER FOR THE STUDY OF READING

Technical Report No. 41

RECALL OF PREVIOUSLY UNRECALLABLE INFORMATION FOLLOWING A SHIFT IN PERSPECTIVE

Richard C. Anderson and James W. Pichert

University of Illinois at Urbana-Champaign

April 1977

University of Illinois
at Urbana-Champaign
1005 West Nevada Street
Urbana, Illinois 61801

Bolt Beranek and Newman Inc.
50 Moulton Street
Cambridge, Massachusetts 02138

CS003612

The research reported herein was supported in part by the National Institute of Education under Contract No. MS-NIE-C-400-76-0116 and Grant No. HEW-NIE-G-74-0007. The authors wish to thank Larry Shirey for his assistance in interviewing subjects and scoring recall protocols and Andrew Ortony and Rand Spiro for their helpful comments on a draft of this paper.

Abstract

College undergraduates read a story about two boys playing hooky from school from the perspective of either a burglar or a person interested in buying a home. After recalling the story once, subjects were directed to shift perspectives and then recall the story again. In two experiments, subjects produced on the second recall significantly more information important to the second perspective that had been unimportant to the first. They also recalled less information unimportant to the second perspective which had been important to the first. These data clearly show the operation of retrieval processes independent from encoding processes. An analysis of interview protocols suggested that the instruction to take a new perspective led subjects to invoke a schema that provided implicit cues for different categories of story information.

Recall of Previously Unrecallable Information Following a Shift in Perspective

It has been known since the turn of the century that the important elements of a prose passage are more likely to be learned and remembered than unimportant elements (Binet & Henri, 1894; Thiemann & Brewer, in press). Recent years have seen increasingly precise formulations of the notion of importance in terms of story schemata (Mandler & Johnson, 1977; Rumelhart, 1975), propositional analysis schemes (Kintsch, 1974), and text grammars (Grimes, 1975; Meyer, 1975; Van Dijk, 1972). These systems yield structural descriptions of the content of a text, but they do not pinpoint the mechanisms by which importance has its effect. Possible explanations for the primacy of important text information abound in the literature. However, these explanations are notable for their informality and vagueness, and there has not yet been research that permits a confident choice among competing accounts.

In this paper we will enumerate possible explanations for the primacy of important text information. The explanations are of two classes: those that suppose processes acting at the time of encoding are responsible and those that presume that the effect is due to processes acting later when information is retrieved and used. Next we shall summarize findings from previous research, paying special attention to evidence that would seem to support a distinction between encoding and retrieval. Finally we will report two experiments on possible retrieval mechanisms.

Our treatment will be couched in terms of schema theory. Schemata are abstract knowledge structures whose elements are other schemata, and slots, placeholders or variables which can take on a restricted range of values (Minsky, 1975; Rumelhart & Ortony, 1977; Schank & Abelson, 1975). A schema is structured in the sense that it indicates typical relationships among component elements. In the simplest case the reader or listener will have a preformed schema adequate to subsume (Ausubel, 1963) a text. The encoded representation of such a text will consist of the subsuming schema in which the slots have been assigned specific values; that is, are instantiated (Anderson, Pichert, Goetz, Schallert, Stevens, & Trollip, 1976) with the particular information in the message. A person will have the subjective sense that a passage has been comprehended when there is a good match between the information presented and the slots in the schema.

A schema at the level required to subsume a text will contain embedded subschemata (Rumelhart & Ortony, 1977). We shall assume that typically the subschemata form a hierarchy, or at least can be represented hierarchically without doing great violence to the interrelationships. The position of a subschemata in the hierarchy reflects its importance. The significant text elements are the ones that instantiate slots in high-order subschemata. In this fashion, schema theory provides an immediate gloss on the primacy in recall of important information. The explanation is saved from being circular because--at least for stereotyped genre such as folk tales, children's stories (Rumelhart, 1975) and detective novels (Cawalti, 1976; Mellard, 1972)-- it is possible to specify in advance the high level schemata that normally will be

brought to bear (Anderson, Spiro & Anderson, 1977; Brown & Smiley, in press; Mandler & Johnson, 1977).

Consider next the processes by which importance may influence encoding. Two alternative accounts seem compatible with schema conceptions. The first can be called the "attention-directing" hypothesis. The schema singles out important elements. More attention is devoted to these elements than less important ones; therefore, they are more likely to be learned.

A second possibility on the encoding side has been termed the "ideational scaffolding" hypothesis (Ausubel, 1963). A schema is bound to contain a slot for an important text element and it could be that the information gets stored precisely because there is a niche for it. Depending upon individual differences among readers, there may not be slots for less important elements. Or, there may be optional slots for unimportant elements, instantiated or not depending on the reader's motivation and on demand characteristics.

We turn now to the possibility that schemata facilitate information retrieval instead of, or in addition to, information storage. Again there is more than one plausible mechanism. Several investigators (Bower, in press; Mandler & Johnson, 1977; Pichert & Anderson, 1977) have speculated that a schema might provide a retrieval plan. The idea is that memory search proceeds from the generic knowledge incorporated in the schema to the particular information stored when the text was read. A top-down schema-based search is very likely to give access to structurally important information, but cannot turn up information unconnected to the schema. Thus, the latter categories of information are relatively inaccessible.

A second possibility is that schemata guide "output editing." This would require postulating that a schema contains within itself an index of importance which, in consort with the demand characteristics of the recall situation, causes the person to establish a response criterion. A person may terminate memory search when the criterion is reached. Or, when information occurs to a subject that falls below the criterion, he or she may not write it into the protocol.

A final possible retrieval process is "inferential reconstruction" (Spiro, 1977). Suppose that a subject were attempting to recall a story about a meal at a fine restaurant (Anderson, Spiro, & Anderson, 1977; Shank & Abelson, 1975). He or she might fail to remember whether a drink was served with dinner, but since there is a slot in his or her schema for a beverage during the meal the subject is led to try to reconstruct this element. If the subject recalls that a beef dish was the entree, red wine becomes a candidate beverage. At this point red wine could be produced as a plausible guess; though after a long retention interval a subject may not be able to distinguish between an element that was in the text and an element produced by inference (Spiro, 1977). Alternatively, once a candidate, such as red wine, had been generated, it might be verified against an otherwise weak or inaccessible memory trace. In any event, the primacy of important text information in recall could be explained in terms of inferential reconstruction. The conceptual machinery of the schema will be biased toward reconstructing important elements.

At least three lines of evidence bear on a distinction between encoding and retrieval. First, there is the research of Dooling and Lachman (1971) and others demonstrating substantial facilitation when a schema-evoking context is furnished prior to difficult-to-understand passages. Bransford and [illegible] (1973) went on to show that a context is not very helpful when presented after such a passage. The Bransford and Johnson materials were unlike normal text, deliberately written so that the referents of expressions were obscure. Nevertheless, it is difficult to escape the conclusion that schemata play a role in encoding.

Two findings seem to implicate processes at work after a passage has been read. Several investigators (cf. Bartlett, 1932; Fredericksen, 1975) have found that the frequency of importations increases with the length of the retention interval. This finding can be taken as evidence for increasing reliance upon inferential reconstruction. If one additionally assumes that correct and incorrect elements are produced by the same process (Spiro, 1977), the finding also gives indirect support, along the lines argued above, to a reconstructive interpretation of the facts about the primacy of important text information. However, it is possible that importations reflect inferences made when a passage was read (Royer, 1977). Shortly after reading a subject may be able to discriminate between elements actually in the text and his own elaborations, so he suppresses the latter. As time passes, the discrimination becomes harder to make, and as a result importations appear more often.

The best available evidence for an independent retrieval mechanism is the repeated finding that important elements continue to appear in recall

protocols after a retention interval, whereas the appearance of unimportant elements declines sharply (cf. Bower, 1976; Newman, 1939). In research that was the immediate precursor of the present studies (Pichert & Anderson, 1977), college students read stories from either of two directed perspectives or no directed perspective. One passage was about two boys playing hooky from school. They go to one of the boys' homes because his mother is never there on Thursdays. The family is well-to-do. They have a fine old home, set back from the road, with attractive grounds. Since it is old it has some defects -- a leaky roof, a damp and musty basement. Because the family has considerable wealth, they have a lot of valuable possessions -- ten-speed bikes, a color TV set, a rare coin collection. Different groups rated the importance of the elements in the story from one of three points of view: the viewpoint of a burglar, the viewpoint of a prospective home buyer, or no directed perspective. Obviously a leaky roof is important to a home buyer but unimportant to a burglar. The reverse is true of a color TV set or coin collection. The average intercorrelation of rated idea unit importance across three prespectives on each of two stories was .11.

Next, independent groups of subjects read the stories taking the various perspectives. The previously obtained ratings of idea unit importance were strongly related to immediate recall. This was true just of ratings obtained under the perspective the subject was directed to take, not other possible but nonoperative perspectives. Also significant was the effect of importance from the operative perspective on one-week recall. The measure was recall of elements after one week given recall of the same elements shortly after reading. Thus, importance was demonstrated to have independent effects on delayed recall.

The fact that importance has effects on delayed recall independent of those on immediate recall seems on its face to require a retrieval explanation, for any influence on what is encoded should show up immediately, or so the argument goes. Among the possible retrieval mechanisms discussed in the foregoing, the retrieval plan notion provides an especially appealing interpretation. All but the simplest stories contain secondary themes and incidental happenings. Normally these are perfectly comprehensible, so it is reasonable to suppose that they are encoded. However, if memory search starts with the generic knowledge in a schema there will be low probability of accessing information that does not connect with this schema. For instance, there presumably are no pointers in a burglary schema to defects in a house such as a musty basement; hence, even if it had been stored, this information could not be retrieved via a top-down search through a burglary schema.

The foregoing account is incomplete in that it still fails to explain why information unrelated to the dominant schema becomes less accessible as time passes. An auxiliary assumption is required, namely that shortly after reading there are other routes, not mediated by the schema, to information unrelated to that schema; and further, that over time these alternative routes become increasingly problematical. This is not an unreasonable assumption. There could be some memory for surface aspects of the message, immediately after reading such as contiguously presented information. To illustrate, a subject mentally canvassing a house for loot under the aegis of a burglary schema might remember a valuable object asserted to be in the basement. This in turn could be a sufficient cue, just after reading but not later, that the next assertion was that the basement was damp and musty.

We have tried to construct a plausible retrieval explanation for the fact that more unimportant than important text elements drop out of recall protocols over a retention interval. However, there is a storage or encoding explanation that some will think equally plausible. A traditional interpretation would be that important elements tend to be overlearned and, therefore, have enough strength to appear at either immediate or delayed recall, whereas a larger proportion of the less well learned unimportant elements are above threshold when recall is attempted shortly after reading but below threshold later.

To summarize, every established fact about prose recall can be given an encoding interpretation. While some findings can also be explained in retrieval terms, none in the previous literature demands such an explanation. On the other hand, the finding that a meaningful context facilitates recall when presented before, but not after, an ambiguous passage does seem to demand an encoding explanation.

The purpose of the experiments described in this paper was to attempt to provide incontestable grounds for the operation in prose recall of retrieval mechanisms distinct from storage mechanisms. Earlier, reasoning within a schema framework, we argued that people may store information when reading a text which they fail to produce when recalling that text. The theory also predicts that if people are caused to change schemata <u>after</u> reading a passage then they will recall additional information, specifically information important to the new schema but unimportant to the schema operative when the passage was read. There are three somewhat different formulations within

schema theory of why this should happen. The first is the retrieval plan hypothesis, according to which the new schema will provide implicit cues for different categories of text information. The second is the output editing hypothesis; under the aegis of a changed schema different categories of text information will fall above a response criterion. The third is the inferential reconstruction hypothesis: a new schema will furnish a different system of concepts for reconstructing important but unavailable information.

Subjects directed to take either a burglar or homebuyer perspective read the story described earlier about two boys playing hooky from school. Everyone attempted to recall the story twice. Half of the subjects were directed to take a new perspective (from burglar to home buyer or vice versa) before the second attempt. If these subjects were to recall additional information important to the new perspective this would be unequivocal evidence for a retrieval process. We, at least, have been unable to think of an explanation for such a result solely in terms of encoding mechanisms.

Experiment 1

Method

Subjects. Thirty-nine introductory educational psychology students participated in this experiment in order to fulfill a course requirement.

Materials. The experimental passage was a narrative about what two boys did at one of the boys' homes while they were skipping school. It contained a number of points of interest to a burglar or real estate prospect. The story was 373 words long and contained 72 idea units which previously had been rated for their relative importance to a burglar and to a prospective homebuyer.

Design and procedure. Subjects were run in groups of 3 to 8. Subjects were told that the study concerned "how people think about and remember stories . . . primarily in memory for the ideas in a story." Subjects were randomly assigned envelopes--which contained instructions, the story, and a test booklet. They read instructions assigning them the burglar or homebuyer perspective and were then given two minutes to read the passage. Next, twelve minutes were allowed to do 84 items from the Wide Range Vocabulary Test (French, Ekstrom, & Price, 1963). Only the first 48 items were scored. The additional 36 items were employed to keep the retention interval uniform. All subjects finished the first 48 items and no subjects finished all 84 in the twelve minute period.

After the vocabulary test subjects turned to two blank pages and read instructions which emphasized, "Please write down as much of the exact story as you can on these two sheets of paper. If you cannot remember the exact words of any sentence, but you do remember the meaning, write down a sentence or part of a sentence as close to the original as possible. It is extremely important that you write down every bit of the story which you can remember.

When everyone had completed the first recall, five minutes were allowed to do six items from the Surface Development Test (French, Ekstrom & Price, 1963). This test requires subjects to mentally "fold" a two dimensional figure to match a three dimensional representation. The task is to match numbered edges on the two dimensional figure with lettered edges on its three dimensional representation.

Next, subjects turned to an instruction page which asked them to recall the story a second time. Half did so from the same perspective and half from the other. Subjects in the no-change condition were told the study was being done to determine whether or not people can remember things about a story they thought they had forgotten if they are given a second chance. Their original perspective instructions were then repeated. Subjects in the change of perspective condition were told, "This study is being done to determine whether or not people can remember things about a story they thought they had forgotten if they are given a new perspective on that story . . . Please try to think of the story you read from the following or new perspective." The new perspective was then described exactly as it had been from those subjects given it originally. Recall instructions were repeated for both groups and the experimenter stressed ". . . this study is attempting to determine differences in persons' recall from one time to the next so please write down every bit of the story which you can remember."

Following the second recall subjects completed a debriefing questionnaire, were thanked for their cooperation, and dismissed.

Scoring. Idea units were identified in the protocols which, according to gist criteria, matched any of the 72 idea units. In the earlier study (Pichert & Anderson, 1977), interrater reliability was .93. No reliability check was made this time.

Results

First recall. Completed first was a 2 x 2 x 3 mixed analysis of variance involving all 72 of the idea units in the story. The between-subjects factors

were perspective given prior to the story (Homebuyer, Burglar) and verbal ability (High, Low). Idea unit importance (High, Medium, Low) was a within-subjects factor. Table 1 summarizes performance on the dependent measure, proportion of idea units recalled. A significant effect was found for idea unit importance, F (2,70) = 66.47, $p < .01$. More high than medium and more medium than low idea units were recalled under both perspectives, replicating our previous finding (Pichert & Anderson, 1977). The only other significant effect was the interaction between perspective and importance, F (2,70) = 19.50, $p < .01$. This appeared because importance was more strongly related to recall under the burglar than the homebuyer perspective, perhaps because college students are relatively less familiar with purchasing real estate.

Insert Table 1 about here

Some information was important to both perspectives while a good deal was trivial from either point of view. A second analysis involved just those idea units whose rated importance was different from the two perspectives. The mean idea unit ratings obtained in the earlier study were converted to standard scores. Then two clusters of idea units were identified. Placed in the first cluster were 15 units rated about 1.5 standard deviations higher under the burglar perspective than the homebuyer perspective. This cluster will be called "burglar information." The complementary procedure was used to define a cluster of 13 idea units of homebuyer information.

Table 2 contains mean proportions of burglar and homebuyer information recalled. An analysis of the first recall data revealed an effect for

cluster, F (1,35) = 26.31, $p < .01$. The burglar information was better recalled than the homebuyer information. More interesting and important was the interaction between perspective and cluster, F (1,35) = 16.58, $p < .01$, which is graphed in Figure 1. The group that had the burglar perspective recalled more burglar information whereas the group that had the homebuyer perspective recalled more homebuyer information. Again, this result confirms our earlier finding (Pichert & Anderson, 1977).

Insert Table 2 and Figure 1 about here

Difference between first and second recall. Two predictions follow from the retrieval hypotheses developed in the introduction. First, people who change perspectives should recall more information important to the second perspective but unimportant to the first. Subjects who changed perspective recalled an additional 7.1% of the now important information. In contrast, the comparison group which did not change perspective recalled 2.9% less of the still unimportant information on the second attempt. This difference was significant, F (1,35) = 9.57, $p < .01$. Neither the particular perspective, $F < 1.00$, nor the interaction between perspective and whether or not there was a shift in perspective, $F = 1.12$, had an effect. Completed also was a subsidiary analysis, involving just the group that shifted perspective, evaluating the increment in recall observed in this group against the null hypothesis of zero change, which was also significant, t (18) = 3.07, $p < .01$.

It is also predicted that people who shift perspective will recall less information that is unimportant to the new perspective. In fact, subjects

who changed perspective recalled a mean of 7.2% less on the second recall of what was now unimportant information whereas there was no change in the control group which maintained the same perspective. However, this difference was not significant, F (1,35) = 2.22, $p < .15$. Nor was decrement in the group that changed perspective significantly different from zero, t (18) = 2.06, $.05 < p < .10$. The increment and decrement in the perspective shift group were the same size, but the latter result was not significant because of the relatively greater variability in the amount of information subjects lost.

Second recall. Considered alone, the data from the second recall are not very interesting. Tests for retrieval effects, much less sensitive than the ones involving first recall-second recall differences already reported, proved to be nonsignificant.

If perspective influences the likelihood that information will be stored, then on the second attempt subjects should have recalled more information important than unimportant to their original perspective. However, the present experiment was not optimally designed to assess encoding benefits, since subjects will have selectively rehearsed more of the information important to the original perspective on the first test. Balancing in the other direction, the experiment had too little power considering the magnitude of the error variance. For what it is worth, on the second attempt more information important to the original perspective was recalled than information unimportant to that perspective, an advantage that was not significant, t (35) = 1.99, $.05 < p < .10$.

Experiment 2

Experiment 2 was completed to determine whether the findings of Experiment 1 could be replicated, and to obtain a set of introspective reports on encoding and retrieval processes.

Method

Subjects. The subjects were 16 undergraduates enrolled in an educational psychology class who participated to meet a course requirement.

Materials, design, and procedure. Half the subjects began with the burglar perspective, half with the homebuyer perspective. Every subject changed perspectives before attempting to recall the passage for the second time; in other words, this study did not include a same-perspective control group.

Loosely structured interviews were conducted after the second recall. The interviewer had a list of questions to ask, but he freely departed from this list to probe ambiguous statements or follow up on interesting leads. Eight subjects were interviewed individually and eight in pairs. The protocols were tape recorded and then type written transcripts were prepared. An informal content analysis of the transcripts was completed. In all other respects, the study was the same as the first.

Results

Difference between first and second recall. The recall data is summarized in Table 3. On the second test, subjects recalled 10% more information important to the new perspective which had been unimportant to the

perspective operative when the passage was read, t (15) = 3.02, $p < .01$. They recalled 21% less of the information that became unimportant in the light of the changed perspective, t (15) = 5.36, $p < .01$. Since there was no same-perspective control group in this experiment, these are tests against the null hypothesis of zero change.

Insert Table 3 about here

Interview protocols. The tallies reported in this section should be regarded as rough indications of the trends in the data. The interviewer did not always ask a question, or ask it in the same way to every subject. Furthermore, subjects, particularly those interviewed in pairs, did not always give direct and responsive answers to questions.

In reply to questions such as "How did the perspective affect your reading?" every one of the twelve subjects asked the question who gave an interpretable answer described a process of directing attention to important elements.

Sample responses:

-- I spent most of the time looking for different items to be interested in when buying a house. So, I noticed the large size of the yard because I'm one who likes area. And then I noticed the new things the father did to the house--the siding, the plumbing. And then the basement was damp. That's one thing I wouldn't like. You know, how the house looked.

-- Yeah, I had it [the perspective] in mind all the way through. I kept in mind all the critical things a burglar would be looking for such as getting in and out, the items that it would be easy to move and take from the building itself.

-- First, I read it straight through without concentrating on anything and then I whipped through it again and scanned it, and I blocked out everything except the specific things a homeowner would be looking for in order to decide whether to buy the house or not.

The interviewer attempted to determine whether subjects suppressed information, asking questions of the form, "Were there things you remembered but did not write down on the first recall?" Of the twelve subjects who were asked this question and provided an answer, nine insisted that they wrote down everything they could remember. For instance, one said

-- No, I tried to write everything down, even if it seemed stupid, you know. I generally wrote what I could remember.

Three gave an affirmative answer but only one of them presented a convincing description of output editing, as follows:

-- Yeah, I remembered a couple of things but I didn't write them down because I didn't think they were important. It wasn't what I was looking for. It wasn't related to buying a house. The possessions, like the jewels, I remember weren't important because they wouldn't go with the house.

The answer of one of the other subjects who said she suppressed information was uninformative, while the third subject seemed to include in remembered information that which was stored but inaccessible:

-- I forgot to say that the house was stone sided and that there was cut glass and china in the living room. [Q: Why didn't you write it down the first time?] Well, I <u>forgot</u> (subject's emphasis).

The interviewer was not programmed to inquire about information suppressed when the story was recalled the second time, but a few subjects mentioned doing this. A couple of more announced while completing the

second recall that (despite the instructions) they were going to write just the information relevant to the second perspective.

Subjects were asked to describe their recall strategies. The interviewer probed to determine why they thought they had recalled new information the second time. Seven subjects described mental processes consistent with the notion of the schema as retrieval plan. Subjects were counted among this group only if they expressly stated that considering superordinate categories of information significant in the light of the perspective caused them to recall particular items of information from these categories. For instance, one subject who shifted from the burglar to homebuyer perspective offered the following reflection:

> -- I only remembered one other thing, the basement. I had forgotten all about that in the first one. [Q: Why didn't you remember that the first time?] I don't know. When I remembered it was when I was upstairs--thinking about the upstairs--in the girl's bedroom and thinking, was there anything wrong with the rug? Was there anything wrong with the house? And then I remembered the basement was damp.

Two subjects who changed from homebuyer to burglar described the process as follows:

> -- I just thought of myself as a burglar walking through the house. So I had a different point of view, a different objective point of view for different details, you know. I noticed the door was open, and where would I go here, go there, take this, take that, what rooms would I go to and what rooms wouldn't I go to. Like, you know, who cares about the outside and stuff? You can't steal a wall or nothing. . . . I remembered [the color TV] in the

second one, but not in the first one. I was thinking about things to steal, things you could take and steal. In the den was the money. China, jewelry, other stuff in other places. [Q: Why do you think you remembered the color TV the second time and not the first time?] Because I was thinking of things to steal, I guess.

-- . . . you say "OK, I'm a burglar, now what do I want to get out of this house," and then you write it down . . . I knew that there were a lot of things, like furs and stuff, that had been described, but I couldn't remember them because I wasn't programmed that way the first time . . . I ended up putting pretty much what I put the first time. I remembered that one of the doors was kept unlocked. I hadn't remembered that the first time but when it said I was supposed to be a burglar that popped into my head. [Q: Why do you think that popped into your head?] Well, because a burglar would want to know that!

Six other subjects said that the new perspective "jogged" their memories, or that when given the new perspective additional information "popped" into their heads. However, this group was not explicit about the reasons additional information was recallable. Several expressly denied self-knowledge of the process. Sample comments:

-- Well, I remembered a couple more items that were of value and I remembered that the door was unlocked or something, so that would help you get in . . . [Q: Why do you think you remembered these other items?] I don't know. I just remembered it as soon as you said to think of it as a burglar. I don't really know what triggered that.

-- Well, a funny thing happened. When he gave me the homebuyer perspective, I remembered the end of the story, you know, about

the leak in the roof. The first time through I knew there was an ending, but I couldn't remember what it was. But it just popped into my mind when I thought about the story from the homebuyer perspective.

-- I forgot about the glass and stuff, though, but remembered it in the second one for some reason. [Q: Do you know why?] No, I have no idea. All of a sudden it just popped into my head.

Discussion

In the present studies people recalled additional, previously unrecalled information following a shift in perspective. There was a significant increase in recall of information important to the new perspective but unimportant to the one operative when the passage was read. It would appear to be impossible to explain this phenomenon in terms of an encoding process, since the perspective shift occurred after the passage had been read and recalled once. A retrieval process seems to be implicated, therefore.

On the basis of previous research there is good reason to believe that schemata also affect encoding or storage processes but, as already noted, the recall data from the present studies did not permit a sensitive, unconfounded test of possible encoding benefits. The interview protocols, however, clearly suggest that readers selectively attend to elements of a story that are significant in terms of an operative perspective. Appropriately designed experiments would probably show evidence in recall of both encoding and retrieval effects.

One caveat about encoding seems well-founded on the basis of the data in hand. Readers must have developed a richer representation for the story material than could be accounted for solely in terms of the dominant schema brought into play by the perspective instructions. Otherwise there would have been no information in the recesses of the mind which could be recovered when the perspective shifted. Evidently the principle of encoding specificity does not extend in a simple way to prose for, if it did, readers would fail to assimilate ideas irrelevant to the dominant schema. It appears, instead, that at least some "irrelevant" information is encoded, and that this information may become available later if a schema to which it connects is invoked.

Among the retrieval explanations for the increment in recall, subjects' self-reports supported the idea that a high-level schema provides the rememberer with a retrieval plan. Seven subjects described a process that fits this hypothesis. They said that they thought of particular information because the perspective led them to think of the general category subsuming this information. Six other subjects, who displayed less metamemorial awareness, made statements consistent with the retrieval plan hypothesis.

A plausible alternative explanation of the fact that subjects recalled previously unrecalled information is that they edited their output according to shifting criteria of importance. Information remembered during the first recall might have been suppressed because it was unimportant to the perspective operative at that time. By and large, the protocol data were not consistent with this interpretation. Most subjects insisted that on the first recall they wrote down everything they could remember.

The recall data also showed decreased recall of information unimportant to the second perspective, again a fact consistent with either a retrieval plan, an output editing, or a reconstructive process. Regrettably, the interviewer did not systematically press subjects to explain why information included in the first protocol did not appear in the second. Nonetheless, it came out in a couple of cases that persons did not bother to write down information unimportant to the second perspective, in other words, that they were editing their output.

Psychologists will have varying degrees of enthusiasm for the method of attempting to illuminate a process by the simple expedient of having subjects talk about it. We find compeling the argument that there is no good a priori reason to suppose that when a person tells you his mind worked in such and such a way that he is mistaken or lying. Many subjects told us that a perspective provided them with a plan for searching memory, specifically that considering the generic concerns of a burglar or homebuyer allowed them to access information relevant to these concerns. Naturally, converging evidence should be sought using other techniques. In the meantime, these self-reports make a prima facie case for the schema as retrieval plan. The self-reports weighed against the notion that the schema mediated editing of responses. However, this evidence should be interpreted conservatively. People are marvelously versatile information processors. If one believes the subjects' self-reports, most of them did not consciously edit their output when recalling the story for the first time. But they might under other circumstances. Indeed, some of them may have done so when recalling the story for the second time in the present studies.

Little has been said about the reconstructive interpretation of the increment in recall following a perspective shift, for the simple reason that the present data weighs neither for nor against this interpretation. We can say only that the variant of the reconstruction hypothesis which would attribute the increment to plausible fabrications seems unreasonable. Simple guessing is unlikely to have allowed subjects to produce the information that Mother was never home on Thursdays or that the roof leaked.

References

Anderson, R. C., Pichert, J. W., Goetz, E. T., Schallert, D. L., Stevens, K. V., & Trollip, S. R. Instantiation of general terms. Journal of Verbal Learning and Verbal Behavior, 15, 667-679, 1976.

Anderson, R. C., Spiro, R. J., & Anderson, M. C. Schemata as scaffolding for the representation of information in connected discourse. (Tech. Report No. 24). Urbana, Ill.: Center for the Study of Reading, University of Illinois, March, 1977.

Ausubel, D. P. The psychology of meaningful verbal learning. New York: Grune and Stratton, 1963.

Bartlett, F. C. Remembering. Cambridge, England: The Cambridge University Press, 1932.

Binet, A., & Henri, V. La memoire des phrases. L'annee psychologique. 1894, 1, 24-59.

Bower, G. H. Comprehending and recalling stories. Division 3 Presidential address, Annual Meeting of the American Psychological Association, Washington, D. C., 1976.

Bower, G. H. Experiments on story understanding and recall. Quarterly Journal of Experimental Psychology, in press.

Bransford, J. D., & Johnson, M. K. Considerations of some problems of comprehension. In W. G. Chase (Ed.), Visual information processing. New York: Academic Press, 1973.

Brown, A. L., & Smiley, S. S. Rating the importance of structural units of prose passages: A problem of metacognitive development. Child Development, in press.

Cawalti, J. G. Adventure, mystery, and romance. Chicago, Ill.: University of Chicago Press, 1976.

Dooling, D. J., & Lachman, R. Effects of comprehension on retention of prose. Journal of Experimental Psychology, 1971, 88, 216-222.

Frederiksen, C. H. Effects of context-induced processing operations on semantic information acquired from discourse. Cognitive Psychology, 1975, 7, 139-166.

French, J. W., Ekstrom, R. B., & Price, L. A. Kit of reference tests for cognitive factors. Princeton, N.J.: Educational Testing Service, 1963.

Grimes, J. The thread of discourse. The Hague: Mouton, 1975.

Kintsch, W. The representation of meaning in memory. New York: J. Wiley & Sons, 1974.

Mandler, J. M., & Johnson, N. S. Remembrance of things passed: Story structure and recall. Cognitive Psychology, 1977, 9, 111-151.

Mellard, J. Prolegomena to a study of the popular mode in narratives. Journal of Popular Culture, 1972, 6, 1-19.

Meyer, B. J. F. The organization of prose and its effects on memory. Amsterdam: North-Holland Publishing Company, 1975.

Minsky, M. A framework for representing knowledge. In P. H. Winston (Ed.), The psychology of computer vision. New York: McGraw-Hill, 1975.

Newman, E. B. Forgetting of meaningful material during sleep and waking. American Journal of Psychology, 1939, 52, 65-71.

Pichert, J. W., & Anderson, R. C. Taking different perspectives on a story. Journal of Educational Psychology, in press.

Royer, J. M. Comments on Professor Spiro's paper. In R. C. Anderson, R. J. Spiro, and W. E. Montague (Eds.), Schooling and the Acquisition of knowledge. Hillsdale, N.J.: Erlbaum, in press.

Rumelhart, D. E. Notes on a schema for stories. In D. Bobrow & A. Collins (Eds.), Representation and understanding: Studies in cognitive science. New York: Academic Press, 1975.

Rumelhart, D. E., & Ortony, A. The representation of knowledge in memory. In R. C. Anderson, R. J. Spiro, & W. E. Montague (Eds.), Schooling and the acquisition of knowledge. Hillsdale, N.J.: Erlbaum, in press.

Schank, R., & Abelson, R. P. Scripts, plans, and knowledge. Proceedings of the fourth international joint conference on artificial intelligence. Tbilisi, Georgia: U.S.S.R., 1975.

Spiro, R. J. Remembering information from text: Theoretical and empirical issues concerning the 'State of Schema' reconstruction hypothesis. In R. C. Anderson, R. J. Spiro, & W. E. Montague (Eds.), Schooling and the acquisition of knowledge. Hillsdale, N.J.: Erlbaum, in press.

Thieman, T. J., & Brewer, W. J. Alfred Binet on memory for ideas. Genetic Psychology Monographs, in press.

Van Dijk, T. Some aspects of text grammers. The Hague: Mouton, 1972.

Table 1

Proportions of all Idea Units Recalled on the First Test at each Importance Level

Perspective	High	Medium	Low
Homebuyer	.55	.49	.41
Burglar	.66	.36	.23

Table 2

Proportions Recalled of Idea Units Whose Importance Varied as a Function of Perspective --Experiment 1

	Information Cluster			
	Burglar		Homebuyer	
First/Second Perspective	1st Recall	2nd Recall	1st Recall	2nd Recall
Burglar/Burglar	.68	.69	.39	.35
Homebuyer/Homebuyer	.70	.68	.58	.58
Homebuyer/Burglar	.54	.64	.58	.56
Burglar/Homebuyer	.73	.61	.37	.42

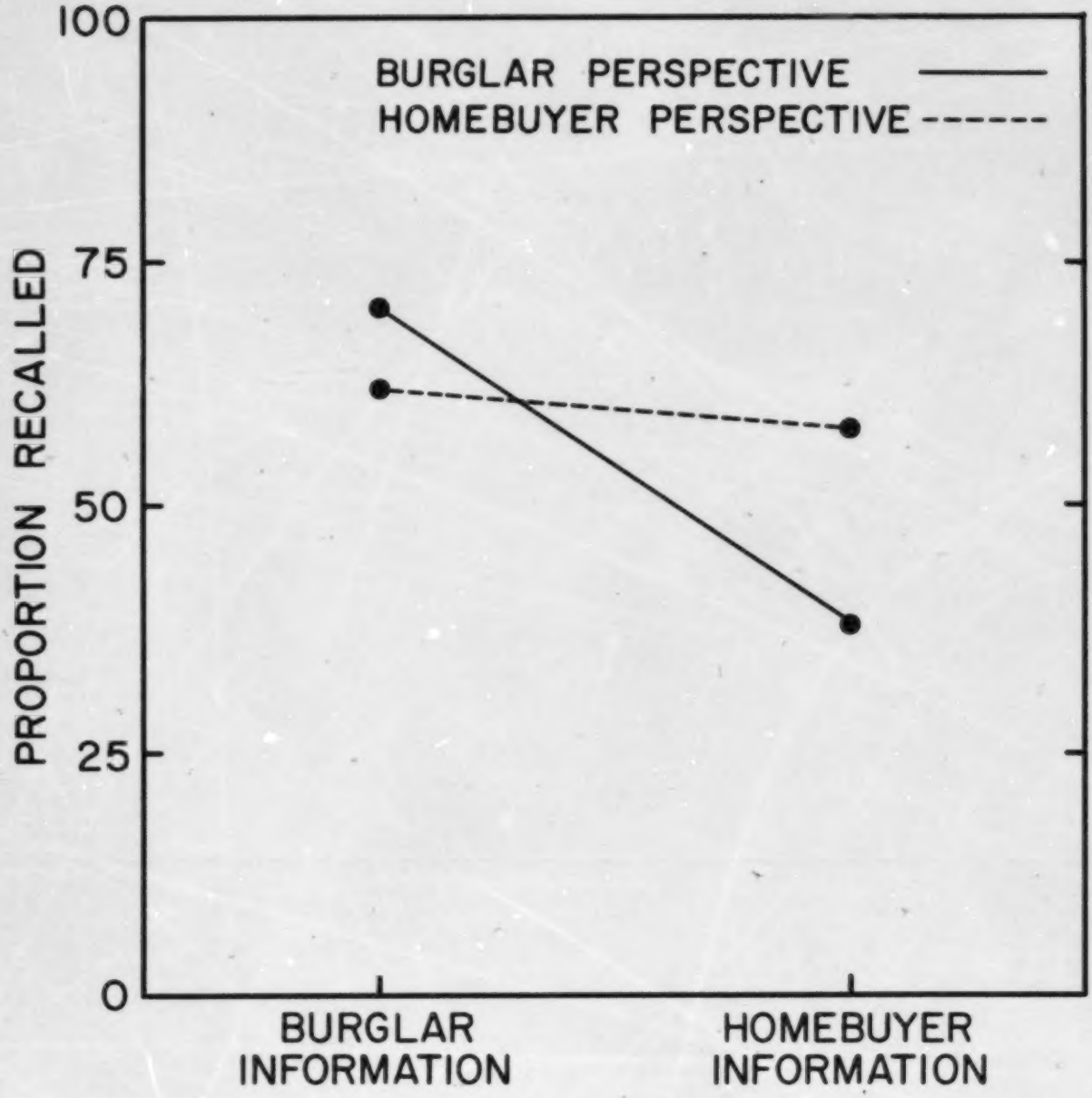
Table 3

Proportions Recalled of Idea Units Whose Importance Varied as a Function of Perspectives--Experiment 2

	Information Cluster			
	Burglar		Homebuyer	
First/Second Perspective	1st Recall	2nd Recall	1st Recall	2nd Recall
Homebuyer/Burglar	.51	.61	.59	.48
Burglar/Homebuyer	.68	.36	.40	.50

Figure Caption

Figure 1. Proportion of perspective-relevant and perspective-irrelevant information recalled on the first test.


100
75
50
25
0
PROPORTION RECALLED
BURGLAR PERSPECTIVE
HOMEBUYER PERSPECTIVE
BURGLAR INFORMATION
HOMEBUYER INFORMATION

CENTER FOR THE STUDY OF READING

TECHNICAL REPORTS

No. 1: Halff, H. M. Graphical Evaluation of Hierarchical Clustering Schemes, October 1975.

No. 2: Spiro, R. J. Inferential Reconstruction in Memory for Connected Discourse, October 1975.

No. 3: Goetz, E. T. Sentences in Lists and in Connected Discourse, November 1975.

No. 4: Alessi, S. M., Anderson, T. H., & Biddle, W. B. Hardware and Software Considerations in Computer Based Course Management, November 1975.

No. 5: Schallert, D. L. Improving Memory for Prose: The Relationship Between Depth of Processing and Context, November 1975.

No. 6: Anderson, R. C., Goetz, E. T., Pichert, J. W., & Halff, H. M. Two Faces of the Conceptual Peg Hypothesis, January 1976.

No. 7: Ortony, A. Names, Descriptions, and Pragmatics, February 1976.

No. 8: Mason, J. M. Questioning the Notion of Independent Processing Stages in Reading, February 1976.

No. 9: Siegel, M. A. Teacher Behaviors and Curriculum Packages: Implications for Research and Teacher Education, April 1976.

No. 10: Anderson, R. C., Pichert, J. W., Goetz, E. T., Schallert, D. L., Stevens, K. V., & Trollip, S. R. Instantiation of General Terms, March 1976.

No. 11: Armbruster, B. B. Learning Principles from Prose: A Cognitive Approach Based on Schema Theory, July 1976.

No. 12: Anderson, R. C., Reynolds, R. E., Schallert, D. L., & Goetz, E. T. Frameworks for Comprehending Discourse, July 1976.

No. 13: Rubin, A. D., Bruce, B. C., & Brown, J. S. A Process-oriented Language for Describing Aspects of Reading Comprehension, November 1976.

No. 14: Pichert, J. W., & Anderson, R. C. Taking Different Perspectives on a Story, November 1976.

No. 15: Schwartz, R. M. Strategic Processes in Beginning Reading, November 1976.

No. 16: Jenkins, J. R., & Pany, D. Curriculum Biases in Reading Achievement Tests, November 1976.

No. 17: Asher, S. R., Hymel, S., & Wigfield, A. Children's Comprehension of High- and Low-Interest Material and a Comparison of Two Cloze Scoring Methods, November 1976.

No. 18: Brown, A. L., Smiley, S. S., Day, J. D., Townsend, M. A. R., & Lawton, S. C. Intrusion of a Thematic Idea in Children's Comprehension and Retention of Stories, December 1976.

No. 19: Kleiman, G. M. The Prelinguistic Cognitive Basis of Children's Communicative Intentions, February 1977.

No. 20: Kleiman, G. M. The Effect of Previous Context on Reading Individual Words, February 1977.

No. 21: Kane, J. H., & Anderson, R. C. Depth of Processing and Interference Effects in the Learning and Remembering of Sentences, February 1977.

No. 22: Brown, A. L., & Campione, J. C. Memory Strategies in Learning: Training Children to Study Strategically, March 1977.

No. 23: Smiley, S. S., Oakley, D. D., Worthen, D., Campione, J. C., & Brown, A. L. Recall of Thematically Relevant Material by Adolescent Good and Poor Readers as a Function of Written Versus Oral Presentation, March 1977.

No. 24: Anderson, R. C., Spiro, R. J., & Anderson, M. Schemata as Scaffolding for the Representation of Information in Connected Discourse, March 1977.

No. 25: Pany, D., & Jenkins, J. R. Learning Word Meanings: A Comparison of Instructional Procedures and Effects on Measures of Reading Comprehension with Learning Disabled Students, March 1977.

No. 26: Armbruster, B. B., Stevens, R. J., & Rosenshine, B. Analyzing Content Coverage and Emphasis: A Study of Three Curricula and Two Tests, March 1977.

No. 27: Ortony, A., Reynolds, R. E., & Arter, J. A. Metaphor: Theoretical and Empirical Research, March 1977.

No. 28: Ortony, A. Remembering and Understanding Jaberwocky and Small-Talk, March 1977.

No. 29: Schallert, D. L., Kleiman, G. M., & Rubin, A. D. Analysis of Differences Between Oral and Written Language, April 1977.

No. 30: Goetz, E. T., & Osborn, J. Procedures for Sampling Texts and Tasks in Kindergarten through Eighth Grade, April 1977.

No. 31: Nash-Webber, B. Anaphora: A Cross-Disciplinary Survey, April 1977.

No. 32: Adams, M. J., & Collins, A. A Schema-Theoretic View of Reading Comprehension, April 1977.

No. 33: Huggins, A. W. F. Syntactic Aspects of Reading Comprehension, April 1977.

No. 34: Bruce, B. C. Plans and Social Actions, April 1977.

No. 35: Rubin, A. D. Comprehension Processes in Oral and Written Language, April 1977.

No. 36: Nash-Webber, B., & Reiter, R. Anaphora and Logical Form: On Formal Meaning Representations for Natural Language, April 1977.

No. 37: Adams, M. J. Failures to Comprehend: A Question of Balance, April 1977.

No. 38: Woods, W. A. Multiple Theory Formation in High-Level Perception, April 1977.

No. 39: Nickerson, R. S., & Adams, M. J. Uses of Context in Speech Understanding and Reading, April 1977.

No. 40: Brown, J. S., & Collins, A. Model-Based Versus Text-Based Reasoning, April 1977.

No. 41: Anderson, R. C., & Pichert, J. W. Recall of Previously Unrecallable Information Following a Shift in Perspective, April 1977.

No. 42: Mason, J., Osborn, J., & Rosenshine, B. A Consideration of Skill Hierarchy Approaches to the Teaching of Reading, April 1977.

No. 43: Collins, A., Brown, A. L., Morgan, J. L., & Brewer, W. F. The Analysis of Reading Tasks and Texts, April 1977.

No. 44: McClure, E. Aspects of Code-Switching in the Discourse of Bilingual Mexican-American Children, April 1977.

No. 45: Schwartz, R. M. Relation of Context Utilization and Orthographic Automaticity in Word Identification, May 1977.

No. 46: Anderson, R. C., Stevens, K. C., Shifrin, Z., & Osborn, J. Instantiation of Word Meanings in Children, May 1977.